

***Pneumatopteris pendens* (Thelypteridaceae),
a New Hawaii Endemic Species of
Pneumatopteris from Hawaii**

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ABSTRACT.—*Pneumatopteris pendens*, a new endemic Hawaiian species related to *P. sandwicensis*, is described.

Over the past 25 years several field workers including Robert Hobdy, Yuko Johnson, Kay Lynch, Hank Oppenheimer, and Ken Wood have noticed and collected a fern related to *Pneumatopteris sandwicensis* (Brack.) Holttum, but one quite distinct in habit, morphology, and habitat. The two species often grow near each other, but usually are not intermixed. The new taxon, here named *P. pendens*, is pendent on damp rock or cinder banks, often near streams, whereas *P. sandwicensis* is erect and grows on level to sloping ground in mesic to wet forests, as well as near stream margins. It has been collected on Kauai, Oahu, Molokai, Maui, and Hawaii and will probably be found on Lanai.

Examination of herbarium sheets at the Bernice Pauahi Bishop Museum revealed several previous collections of *Pneumatopteris pendens* that were variously labeled *P. sandwicensis*, *Dryopteris stegnogrammoides*, *Phegopteris polycarpa*, and *Thelypteris stegnogrammoides*. Table 1 lists characters that separate *P. pendens* from *P. sandwicensis*.

Hillebrand (1888) may have recognized *P. pendens* as *Phegopteris polycarpa* (Hook. & Arn.) Hillebr. var. *depauperata* Hillebr., but his description is short and inadequate: “Frond with stipes 10’ [inches] long, pubescent throughout, pinatifid in the upper half, only 2–4 pairs of veinlets anastomosing”. Furthermore no type was designated, only a type locality (“On bare rocks in the bed of Wailuku river, Hilo, Hawaii!”). Palmer (2003) mentioned *P. pendens* as a possible new taxon and stated that further study and more collections were needed.

The other species of *Pneumatopteris* found in Hawaii are *P. hudsoniana* and *P. sandwicensis*. The following key will aide in identifying the three Hawaiian species.

KEY TO THE HAWAIIAN SPECIES OF *PNEUMATOPTERIS*

1. Basal 2–6 pinnae pairs abruptly and markedly reduced in size; rachises and costules sparsely clothed with hairs; indusia present *P. hudsoniana*
1. Basal pinnae usually not smaller or only somewhat smaller than pinnae above; rachises and costules heavily covered with hairs; indusia absent (2).
 - 2.(1). Fronds pendent on wet banks of streams, lanceolate, light green; pinnae 4–5 times as long as wide stipes 1–2 mm diam *P. pendens*
 2. Fronds erect on mesic to wet forest floors, long-deltate, dark green; pinnae 6–10 times as long as wide stipes 4–15 mm diam *P. sandwicensis*

TABLE 1. Characters separating *Pneumatopteris pendens* from *P. sandwicensis*.

Character	<i>P. sandwicensis</i>	<i>P. pendens</i>
Habitat	mesic to wet forest floors, sometimes near steams	wet banks often near streams
Elevation	750–2,100 m	380–1,220 m
Habit	erect	pendent
Fronnd texture	coriaceous	chartaceous
Fronnd length	20–120 (–206) cm	22–60(–80) cm
Blade shape	long-deltate, 12–48 cm wide	lanceolate, 5.5–14 cm wide
Blade color	mostly dark green	mostly light green
Stipes	glabrous to slightly hairy at base, 4–15 mm diam.	very hairy at base, 1–2 mm diam.
Pinnae	6–10 times as long as wide	4–5 times as long as wide
Pinna margins	moderately hairy	very hairy
Basal pinnae	mostly equal to or longer than next pinna-pair	mostly shorter than next pinna-pair
Vein anastomoses below sinuses	3–10+	2–4
Hairiness of rachises and costules	moderately hairy	very hairy
Hair length on rachises and costae	mostly 0.1 mm long, some longer	0.1–0.5 mm
Scales	dark, thick, clathrate, oblong-lanceolate, margins hairy	mostly tan, thin, lightly clathrate, linear-lanceolate, margins very hairy
Sporangial hairs	mostly 0–4	mostly 6–12

Pneumatopteris pendens D. D. Palmer, *sp. nov.* **Fig. 1a–c**

TYPE: U.S.A., Hawaii, Hawaii Island, Hawaii Volcanoes National Park, Puna District, Thurston Lava Tube, ca. 1158 m, 2 April 2003, *L. W. Pratt 3306* (holotype BISH)

Pneumatopteris sandwicensis similis sed frondibus ubique multo hirsutioribus, stipitibus basi squamis tenuibus brunneolisque instructis, et laminis ovato-triangularibus, pallide viridibus, pendentibus; clivos praecipites humidus habitans.

Apparently related to *Pneumatopteris sandwicensis* but fronds lanceolate rather than deltate, generally smaller and narrower with more obtuse pinnae, lighter blade color, narrower stipes, and longer hairs on the stipes and rachises. Found between 368–1220 m elevation on Kauai, Oahu, Maui, and Hawaii. Its fronds are pendent on vertical, moist, mossy banks, often near streams.

Plants medium-sized, terrestrial. *Rhizomes* short-creeping, ca 0.5–1 cm diam, scaly. *Fronnds* 22–60(–80) × 5–14 cm. *Stipes* straw-colored, 1–2 mm diam, sparsely scaly at base; scales thin, tan, lightly clathrate, lanceolate, margins with scattered to copious acicular hairs; proximal stipes densely clothed with white, unicellular to multicellular acicular hairs, 0.1–0.5 mm,

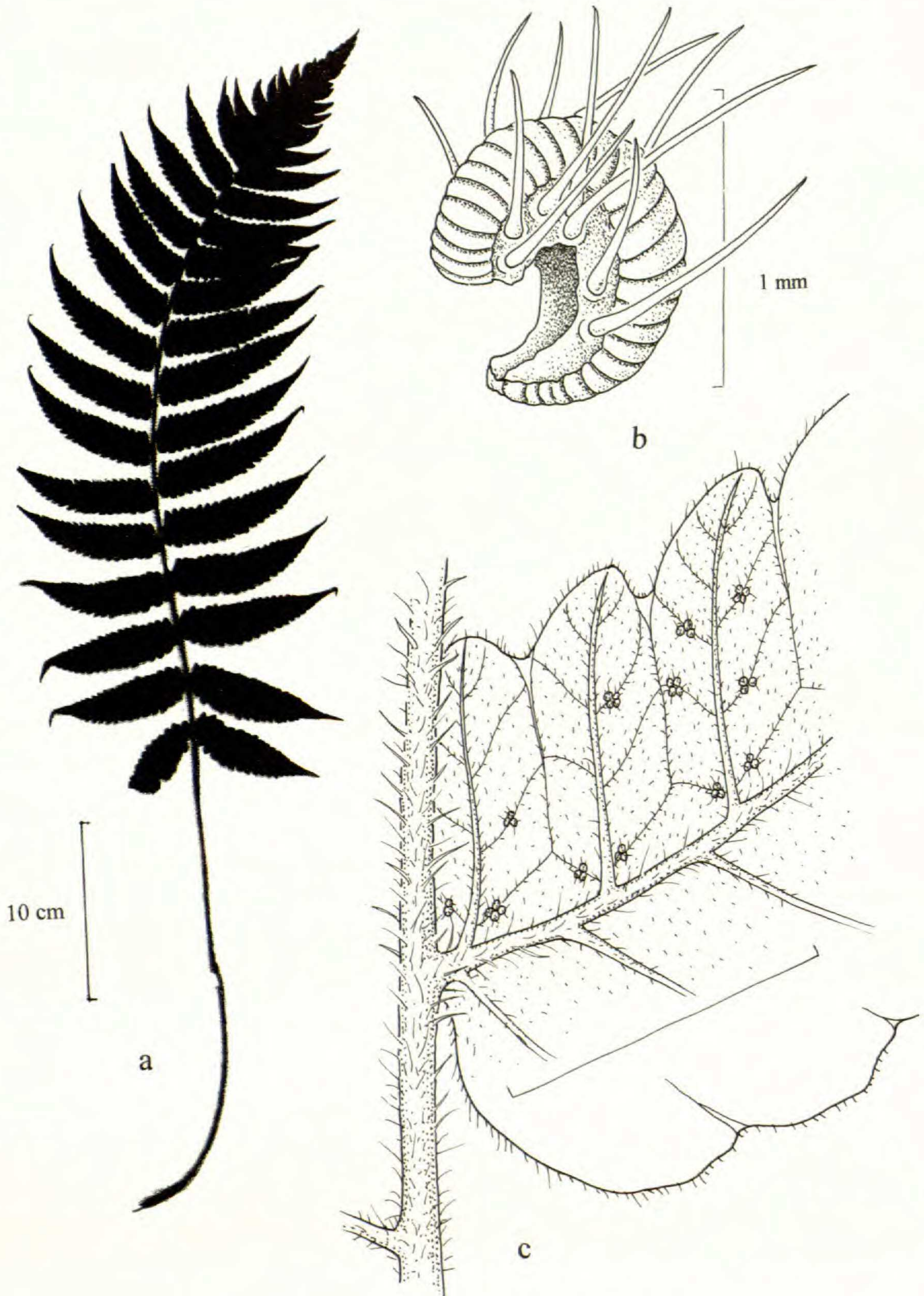


FIG. 1. *Pneumatopteris pendens*. A. Silhouette. B. Sporangia. C. Proximal pinna and rachis, abaxial surface.

sparsely hairy distally. *Blades* lanceolate, 1-pinnate, chartaceous, mostly light green, sometimes medium green, apices pinnatifid; *rachises* grooved adaxially, covered with abundant, short, fine, white, unicellular and multicellular acicular hairs. *Pinnæ* light green, short-stalked to adnate, 12–23 pairs before pinnatifid apices, 4–5 times as long as wide, lanceolate, acute, margins crenate and very hairy; basal pinnæ usually slightly smaller to somewhat smaller than next pair; costules densely covered with short and long, fine, white, acicular hairs, abaxial surface quite hairy; adaxial surfaces less so; hairs acicular, fine, mostly unicellular; veins on adaxial surfaces with many short, acicular hairs pointing toward margins; aerophores inconspicuous at bases of stalks abaxially (more prominent in living plants, nearly invisible when dried). Veins pinnately arranged with 4–6 alternate branches, raised above pinna surfaces abaxially, somewhat sunken adaxially, usually 2–4 pairs anastomosing below each sinus. Sori medial, 2–4 on either side of midveins. Indusia absent. Sporangia each with mostly 6–12 acicular hairs just below annulus.

PARATYPES: U.S.A. HAWAII: **Kauai**: Olokele Valley, Sept 1909, *C. N. Forbes* 451 (BISH). **Molokai**: Kaluaaha Valley, Aug 1912, *C. N. Forbes* 371 (BISH). **West Maui**, Lahaina District, Pu'u Kukui Watershed, Honolua Valley, 380 m, 11 Feb 1999, *H. Oppenheimer* H29902 (BISH-3 sheets). **Maui**: West Wailuaiki Stream, 427m, 15 May 1981, *R. Hobdy* 1096 (BISH); West Wailuaiki Stream, 427 m, 15 May 1981, *R. Hobdy* 1098 (BISH); West Wailuaiki Stream, 427 m, 15 May 1981, *R. Hobdy* 1099 (BISH). **East Maui**: West Wailuaiki Stream, 15 May 1981, *R. Hobdy* 1097 (BISH); Kuhiwa Stream, 457 m, 28 July 1987, *R. Hobdy* 2910 & 2911; Keanae Valley, 400 m., 30 Dec 1986, *R. Hobdy* 2664 (BISH); Hana District, Hanawi Stream, 22 Aug 1999, *H. Oppenheimer* H89927 & H89927 (BISH); Waihoi Valley, 750 m, 21 Sept 1972, *B. Harrison* 9 (BISH); Kipahulu Valley, east part of valley on banks of stream below central pali, 762 m, 7 Aug 1967, *C. H. Lamoureux* & *R. E. Dewreede* 3914a. **Hawaii**: Kilauea, Thurston lava tube, el., 1220 m, May 1932, *A. Meebold* s.n. (BISH); S. Kohala District, Kohala Mts., Kohakohou Stream, below diversion dam, deeply carved drainage, 26 Oct 1995, *K. R. Wood* 4697 (BISH); near Hilo, Hawaii, 1910, *M. Newell* s.n. (BISH 03921); Ka'u, Hilea Stream, on high protected banks, 700 m, 2 Mar 2000, *F. R. Warshauer et al.* 5100 (BISH).

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LITERATURE CITED

- HOLTUM, R. E. 1977. The family Thelypteridaceae in the Pacific and Australasia. *Allertonia* 1: 169–234.
- HILLEBRAND, W. 1888. *Flora of the Hawaiian Islands: A Description of Their Phanerogams and Vascular Cryptogams*. New York: B. Westermann and Co.
- PALMER D. D. 2003. *Hawaii's Ferns and Fern Allies*. University of Hawaii Press, Honolulu.